

The Agricultural Resource Management Study: Serving the Information Needs of Agriculture

USDA's Agricultural Resource Management Study (ARMS) serves the need of farmers and policymakers for increasingly broad information about conditions in agriculture and about agriculture's contribution to environmental quality. The ARMS gathers data to show a detailed picture of the economics of agricultural production and is the only such information source available to address many agricultural policy issues.

Data collected through the ARMS are the primary source of information to the agricultural community about agricultural resource use, costs of production, the environment, the structure and financial condition of farm businesses, and the economic well-being of farm operator households. These data are important to addressing the question of how agriculture can produce high-quality food and fiber products and at the same time maintain the long-term viability of the natural resource base and farm businesses.

The ARMS, established in 1996, has improved the efficiency of data collection by combining the former Cropping Practices Survey and the Farm Costs and Returns Survey into a single, integrated effort. ARMS was designed with a flexible structure that accommodates a variety of questionnaire versions focusing on specific topics of interest. Special commodity cost-of-production versions are rotated every 5 to 6 years to focus on resource use and production cost for each targeted

commodity. The flexible structure also allows for collection of data on varying resource use and financial issues, such as national irrigation use, animal waste management, or risk management strategies like revenue insurance.

Each year, the study is conducted in three phases. The initial phase, which takes place in June, July, and August, collects general farm data such as crops grown, livestock produced, and sales of farm commodities. This phase generates screening data that are used to identify farms for inclusion in the other, issue-driven phases of the study. Using the screening data allows the second phase of the study to be directed to farms producing the commodities targeted for analysis in that year, reducing respondent burden and making the survey more cost-efficient. This second phase, conducted in the fall, collects data associated with agricultural production practices, application of technology, and resource use.

Phase III, conducted February through April, collects data about whole-farm income, assets, debts, managerial attributes, and specific data on costs for selected commodities. Respondents to the commodity cost-of-production questionnaire of Phase II are also asked to complete a Phase III follow-on that includes a shortened set of farm financial, resource use, and cost-of-production questions. The combined set of Phase II and Phase III data provides the link between agricultural resource use and farm financial conditions, fulfilling a major purpose of the ARMS design.

The detailed information gathered by this targeted, three-phase process allows, among other things, for accurate estimates of commodity costs. Most farm operations produce more than one commodity, which leads to problems in determining commodity costs. For example, tractors and implements are usually used for many activities on a farm, and costs for their use on a single commodity cannot easily be separated from whole-farm costs. Therefore, it is necessary to collect data on each separate field operation in order to estimate the share of costs accounted for by the commodity being surveyed.

Data collected from farmers in the ARMS are confidential. Those who work with the individual farm data are forbidden by law from disclosing any individual data and are subject to heavy penalties, including fines and prison, if they allow disclosure. Data from an individual farm are never released to any government official nor to anyone outside the government—the data are summarized in such a way that disclosure of data from individual farms is not possible.

How Are the Data Used?

Farmers may not realize that data they provide are the basis of general statistics on agricultural production presented to them and to the public. They may receive the information through farm magazines, newspapers, radio and television

Availability of ARMS Data

NASS publishes two reports from the ARMS, *Agricultural Chemical Usage -Field Crops* and *Farm Production Expenditures*. Most NASS State offices carry information from these two reports in their publications. ERS prepares State, regional, and national reports on the operating and financial characteristics of farms by type of farm, and by income and debt/asset categories, which are also available to NASS State offices. ERS also publishes a number of reports that depend on data from the ARMS, including the *Annual Report to Congress on the Status of Family Farms*, *Financial Performance of U.S. Farm Businesses*, and *Farm Operating and Financial Characteristics*.

Three internet sites carry summaries of the ARMS data online. Much of the farm financial information produced by ERS may be found at <http://www.econ.ag.gov/Briefing/fbe/>. *Agricultural Resources and Environmental Indicators*, an ERS handbook, may be found at <http://www.econ.ag.gov/Briefing/arei/arei.htm>. NASS reports can be found at <http://usda.mannlib.cornell.edu/reports/nassr/other/pcu-bb/>.

Researchers interested in access to datasets generated by the ARMS survey should contact Dave Banker (dbanker@econ.ag.gov) for information on availability.

Agricultural Economy

ARMS Data Indicate That Farm Household Income Varies By Type of Farm

Data from the ARMS made it possible to construct a typology of U.S. farms.

Small farms have sales less than \$250,000. They include:

Limited-resource (291,700 farms):

operator household income under \$20,000, farm assets under \$150,000, and gross sales under \$100,000.

Retirement (261,400 farms): operator's major occupation is retired.

Residential/lifestyle (537,200 farms): operator's major occupation is "other," i.e., neither farming occupation nor retired.

Lower sales (524,800 farms): operator's major occupation is farming and farm sales are under \$100,000.

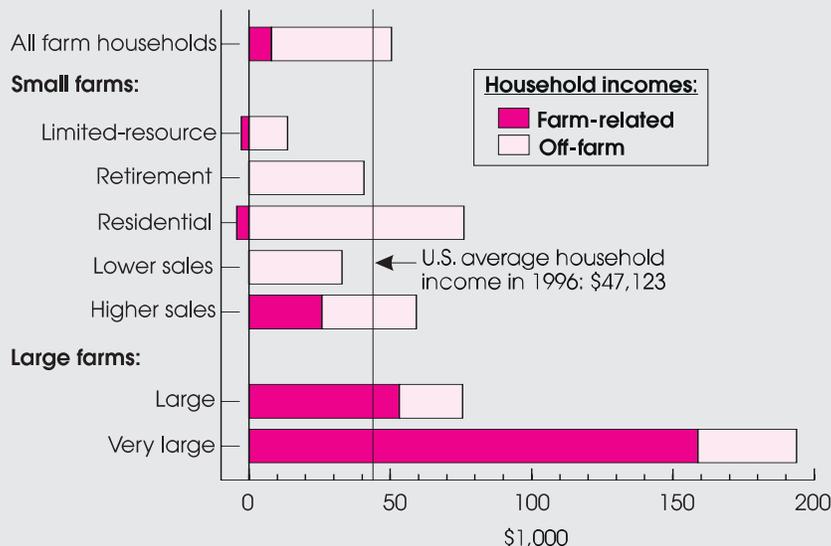
Higher sales (192,300 farms): operator's major occupation is farming and farm sales are \$100,000 to \$249,999.

Large farms have sales of at least \$250,000. They include:

Large (95,500 farms): farm sales are \$250,000 to \$499,999.

Very large (58,800 farms): farm sales are

\$500,000 or more.



Data source: Agricultural Resource Management Study, 1996.
Economic Research Service, USDA

spots, or through extension advisors or land grant university publications, often with no identification of the data source. But it is farmers' participation in the survey that ensures accurate and reliable estimates of practices, technologies, and inputs used in agricultural production.

The national coverage of ARMS reflects the varied financial and resource characteristics of producers across the U.S. Researchers use the data from the ARMS to investigate farm sector structure and performance, including measurement of farm production costs, farm income, and other indicators of farm financial performance. The data allow researchers to evaluate the comparative economic performance of farming operations by size, region, commodity speciality, and other structural parameters, including operator demographics, and to understand approaches that farmers and their households take to manage risk. Policymakers target programs and respond to changing economic and environmental conditions based on this information.

Congress, USDA, farm organizations, commodity groups, and agribusinesses rely on summaries of the data to better understand the problems and issues facing producers. For example, producer associations and USDA's Farm Service Agency use summaries of ARMS data on the costs of production, particularly when developing proposals for programs designed to assist farmers. ARMS data are used to produce annual estimates of the cost of producing wheat, feed grains, cotton, peanuts, tobacco, sugar, and dairy commodities, which are then used to assess the distribution of costs across and within commodity groups. The cost data can be used to analyze differences between low- and high-cost producers and to conduct studies of the cost efficiencies of different production practices such as conservation tillage.

ARMS data are indirectly used by the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce in producing estimates of the Gross Domestic Product (GDP)—analysts at USDA's Economic Research Service use ARMS data to prepare the farm sector data that are then transmitted to BEA for calculation of the farm portion of the GDP. If the ARMS data were not available, the BEA would need to conduct its own survey of farm operators in order to determine the contribution of agriculture to the national income and product accounts.

Costs and returns estimates also shed light on changes in the relative efficiency of crop and livestock production and the break-even prices needed to cover costs. The estimates also make it possible to develop regional estimates of costs and input use by size and type of farm. Commodity prices, and thus cash receipts, change in response to weather and to national or international events. To reflect the distribution and impact of these problems on farms and farm households, it is important to be able to monitor the health of the agricultural economy by region, as well as by size and type of operations.

The agricultural community is faced with many complex environmental issues, and the data collected by the ARMS can guide policymakers as they consider how best to approach these issues. For instance, ARMS data on fertilizer and pesticide use are being used in water quality studies. Data on machinery use and crop rotations are helping to identify tillage systems and crop residue levels that reduce soil erosion and that contribute to carbon sequestration, which may help mitigate global warming. ARMS data on pesticide use also can help determine the economic impact on producers of restrictions on the use of pesticides.

ARMS data demonstrate the speed at which U.S. farm operators are adopting newer technologies. The 1997 ARMS indicated, for example, that although precision farming technology was introduced only within the past 3-4 years, yield monitors were being used on more than one-sixth of the corn acreage surveyed and about one-eighth of soybean acres. ARMS data also show that all three accepted conservation tillage practices—reduced tillage, mulch tillage, and no-till—are commonly used in corn production; only one-fourth of all corn is still being grown with conventional tillage practices.

Data from the 1996 ARMS suggest that real economic efficiencies occur for corn producers using some form of conservation tillage—conservation tillage systems resulted in an 11-percent cost reduction compared with conventional tillage. The advantage of conservation tillage varies by region and soil type, but with the exception of the Lake States region on moderate-productivity soil, conservation tillage provided substantial cost savings.

Annual collection of general farm and ranch data are used to develop estimates of net farm income. Data from the ARMS provide the only national perspective on farmers' and ranchers' net farm income and financial situation, a crucial component of decisions made within USDA in response to changing economic conditions and policies. For example, the change in agricultural policy enacted in the Federal Agriculture Improvement and Reform Act of 1996 exposed farmers to increased level of market risk. Farmers' attitudes toward risk and their ability to sustain higher levels of risk in the open market can be explored through the data obtained in ARMS.

Current concerns about the welfare of producers on small farms and the income potential of these producers make collection of income and balance sheet data essential. The ARMS provides the data necessary to develop annual estimates of the farm operation's assets, debts, equity, capital gains, capital flows, and the rates of return to agricultural resources, and to determine how these items change from year to year. Areas of poor financial performance and pockets of potential stress can then be identified and comparisons undertaken among types of farms.

In response to the January 1998 report of the National Commission on Small Farms, ERS developed a new typology of farms using data from the ARMS. The Commission classified farms with gross sales of less than \$250,000 as small farms, a description that includes approximately 9 out of 10 farms. Such a broad category includes farms that vary

ARMS Provides Data/Information on Adoption and Costs of Conservation Practices



Economic Research Service, USDA

widely in their business and operator household characteristics, and that differ in their policy needs. The new typology identifies five subgroups of small family farms and two subgroups of large family farms, with the remainder in nonfamily farms. The ARMS is the only source of farm business and farm household data complete enough to produce the typology at the national level.

The ARMS also provides the financial data necessary to determine how farm household finances change from year to year. The ability to pay operating costs and the interest and principal due on debts can change very rapidly in response to drought, flood, or other circumstances. However, farm and ranch operators and their households may not depend solely on the income from the farm and ranch business. Off-farm work is critical to the financial well-being of many farm households, and even the households of large commercial farms have substantial off-farm income. The ARMS is the only national data source that provides the information necessary to show a complete picture of the financial conditions of farmers.

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